**ROCK CANDY AND IDENTIFICATION**

LAB REPORT – 96 pts.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Group #: \_\_\_\_\_\_\_\_

Period: \_\_\_\_\_\_\_\_

**OBJECTIVE:** To create the monoclinic crystal system of sugar and identify various rocks and minerals.

**QUESTION:** How can we represent a crystal system through making rock candy?

**HYPOTHESIS:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(1 pt.)**

**MATERIALS:**

* Bunsen burner
* Gas tube
* Ring stand
* Wire gauze
* Striker/Lighter
* 400 mL. beaker
* Balance scale
* Sugar
* Plastic spoon
* Food coloring
* Name label
* Coffee stirrers
* Beaker tongs
* Glass jar
* Stirring rod
* Thermometer
* Mineral Collection
* Rock Collection
* Copper penny
* Streak plate
* Glass
* Steel nails
* Magnet
* Paper towel
* Colored pencils
* Lab apron
* 1 lab report sheet per student

**INTRODUCTION:**

Solubility of substances improves with stirring (mechanical energy) and by heating (adding heat energy). You will find that the **solvent** (water) dissolves only so much **solute** (sugar). After a while, the excess solute precipitates to the bottom. When this happens, the liquid is a **saturated solution**.

Materials (solutes) dissolve in larger quantities when placed into heated liquids (solvents) because the molecules of the heated liquids vibrate further apart. The spaces between the molecules become greater and more solid molecules (sugar) can fill these spaces. Sugar has a monoclinic crystal system. As the liquid cools down, the spaces between the molecules become smaller and the excess solids precipitate to the bottom. Heating solvents to dissolve additional materials allows one to obtain a **supersaturated solution**. We use supersaturated solutions to make JELL-O, and many crystals used for computers and the electronics industry. Molecules are always vibrating, unless one removes their energy by cooling them to absolute zero (-273°C, or -460°F). To date, scientists have been unable to reach an absolute zero with the molecules because they are always vibrating – they never stop moving!

A **mineral** is a naturally occurring, inorganic, crystalline solid with a fixed chemical composition. We use several properties of minerals to help in identifying them including color, streak, luster, cleavage, fracture, crystal system, density, and special properties. All **rocks** are made from minerals and the three major categories of rocks include igneous, sedimentary, and metamorphic.

**PROCEDURE:**

1. Make sure all lab ware is cleaned thoroughly using a small drop of soap and water and the brushes at the lab sink.
2. Firmly attach the gas tube to both the Bunsen burner and the gas nozzle at your lab station. Keep the gas nozzle turned off for the time being.
3. Set up your ring stand with the ring approximately 2 inches above the Bunsen burner. Take out the name label and place your period number, along with the last names of all group members, on it and place on your beaker.
4. Set the wire gauze on the ring and fill your beaker with 125 mL. of water, placing it on the wire gauze when filled.
5. Take your glass jar to the center lab station where the sugar is located. Using the balance scale, retrieve 8 oz. of sugar (2 oz. at a time) and place into your glass jar. In order to get an accurate measurement of 2 oz. each time, you will first to make sure the balance scale is reading in oz. (switch using the “mode” button if necessary). Place your glass jar on the balance scale and “tare” to 0. Then, place the sugar in the glass jar until you have a reading of 2 oz.
6. Using your lighter, create a flame and hold over the top of the Bunsen burner. Turn your gas nozzle to the ON position and once your burner is lit, remove the lighter. The desired flame should be a blue double-coned flame. You may need to alter the air flow using the adjustment knob on your Bunsen burner to get this type of flame. Ask the instructor for assistance if needed.
7. Heat the water, reading the temperature with the thermometer periodically. Once it reaches approximately 90°C, begin adding sugar, 2 oz. at a time, stirring with the stirring rod to dissolve. Once 2 oz. of sugar has been added, add any coloring (3 drops maximum) you wish.
8. Repeat step 6 until a total of 8 oz. of sugar has been added to your mixture. Continue adding the sugar until no more will dissolve and the solution is supersaturated (you can tell when you reach this point because sugar will begin to settle at the bottom of your beaker rather than dissolve).
9. Once your solution is supersaturated, turn off the gas nozzle at your lab station.
10. Go back to the center lab station where the sugar was located and pour a few spoonfuls of sugar into the empty glass jar. Spread this sugar out on the paper towel at your lab station. Dip all coffee stirrers into the supersaturated solution then roll in the sugar. This is referred to as “seeding”, since you are placing seeds on the coffee stirrers in order for crystallization to occur.
11. Allow the supersaturated sugar solution in your beaker to cool along with the seeded coffee stirrers cool until five (5) minutes remain in the period. While you are waiting, clean up your lab station rinsing all lab ware thoroughly and wiping down any sticky spots on the counter tops.
12. After the cooling period has passed, carefully, using your beaker tongs, remove the beaker from the wire gauze and place on a paper towel at your lab station. Put the seeded coffee stirrers into the beaker and place it on the storage table for 1-2 weeks for crystal growth.
13. Fill in the data table below each time you make an observation of the solution. **(3 pts.)**

|  |  |
| --- | --- |
| **OBSERVATION #** | **DETAILED DESCRIPTION** |
| **1** |  |
| **2** |  |
| **3** |  |

1. Begin with the mineral collection. Draw your samples in the designated box under the diagram portion using colored pencils and providing as much detail as possible. After your mineral samples have been drawn, you may proceed to the mineral identification. You may use your classroom notes and the mineral properties chart distributed in class for assistance.
2. Once all mineral drawings and questions are completed, it is time to progress to the rock collection. Draw your samples in the designated boxes under the diagram portion using colored pencils and providing as much detail as possible. After your rock samples have been drawn, you may proceed to the rock identification, again consulting your notes and the rock properties chart distributed in class for assistance.
3. After you make your 3rd observation of your rock candy, you will show the crystallized coffee stirrers to the instructor and place them on a paper towel on the storage table.

**MINERAL DIAGRAMS: (1 pt. each)** - *Draw the appropriate diagrams for the following spaces in color.*

#1 #2 #4 #5 #8 #10

#11 #12 #17 #18 #19 #47

**MINERAL IDENTIFICATION (2 pts. each)** *– Observe all mineral samples and identify their properties. Using your minerals properties chart, determine a name for each numbered sample.*

#1 #2 #4 #5 #8 #10

Color: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Streak: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Luster: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Cleavage: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Fracture: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Hardness: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Name: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

#11 #12 #17 #18 #19 #47

Color: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Streak: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Luster: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Cleavage: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Fracture: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Hardness: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Name: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

**ROCK DIAGRAMS: (1 pt. each)** - *Draw the appropriate diagrams for the following spaces in color.*

#1 #3 #5 #6 #7 #8

#10 #11 #12 #13 #20 #33

**ROCK IDENTIFICATION (2 pts. each)** *– Observe all rock samples and identify their properties. Using your rock properties chart, determine a name for each numbered sample.*

#1 #3 #5 #6 #7 #8

Classification: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Color: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Grain Size/Tex: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Formation: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Name: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

#10 #11 #12 #13 #20 #33

Classification: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Color: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Grain Size/Tex: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Formation: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Name: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

**LAB QUESTIONS (1 pt. each) –** *Please write your answers in* ***COMPLETE SENTENCES****!*

1. Name the 5 different characteristics that define a mineral.

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1. What two groups are minerals categorized into?

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1. What is the basic building block for all silicate minerals?

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1. Explain why color is not the best property used to identify a mineral?

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1. Name and explain the different types of non-metallic luster.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Name the different types of cleavage exhibited in minerals, specifying how many planes for each.

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1. Differentiate between the types of fracture.

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1. Explain the different types of crystal systems minerals can exhibit.

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1. What type of crystal system did you observe in your rock candy?

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1. Which mineral has the special property of double refraction?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Define a rock and thoroughly explain the rock cycle.

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1. Name the 3 types of rocks, defining each one.

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1. Differentiate between felsic and mafic igneous rocks.

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1. What are the two main causes of metamorphic rock formation?

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1. Explain foliated and non-foliated metamorphic rocks.

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**CONCLUSION (5 pts.) –** *Write a solid paragraph (at least 5 sentences) about your conclusions from the lab. Discuss the steps you went through during your lab experiment, what you accomplished, and how you tested your hypothesis. Also include what you learned as a result of this lab experiment.*

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